

I CLAIM:

1. A device comprising:
means for providing an oscillating magnetic field;
a printed circuit board;
a moving beam scanner, the scanner comprising:
a substrate;
a laser light source mounted to the substrate;
at least one light receiving photodiode mounted to the
substrate;
a cap mounted over the substrate;
a lens for focusing the laser light source onto a target;
a lens for collecting light reflected from the target;
means mounted to the scanner for interacting with the means
for providing an oscillating magnetic field;
at least one flexible connector mechanically and electrically
coupling the scanner and the circuit board such that a range of oscillation between
the scanner and the circuit board is possible; and
wherein the scanner lacks a mirror and a scanning component.
2. The device of claim 1, wherein the device is a mobile phone, pager,
or personal data assistant.
3. The device of claim 1, wherein the substrate comprises a printed
circuit board having an area of approximately 4×4 mm.

4. The device of claim 1, wherein the laser light source comprises a VCSEL laser chip.

5. The device of claim 1, wherein the at least one light receiving photodiode comprises a CCD device.

5 6. The device of claim 1, wherein the cap, focusing lens, and receiving lens are formed of plastic.

7. The device of claim 1, wherein the magnet is mounted to the cap.

8. The device of claim 1, wherein the magnet is mounted to the substrate.

10 9. The device of claim 1, wherein the at least one flexible connector comprises a plurality of resilient spring-like members, one end of each member attached to the printed circuit board and the other end attached to the scanner.

10. The device of claim 9, wherein the other end of each member is attached to the substrate.

15 11. The device of claim 9, wherein there are at least 5 members.

12. The device of claim 1, wherein the range of oscillation is $\pm 20^\circ$ relative to a central rest position.

13. The device of claim 1, wherein the means for providing an oscillating magnetic field comprises a vibration motor, and the means mounted to the scanner for interacting comprises a magnet mounted to the cap, wherein the vibration motor is arranged externally relative to the cap.

5 14. The device of claim 1, wherein the scanner is oscillated such that the laser light source, focusing lens, and cap remain fixed relative to each other.

15. In combination, a moving-beam scanner and a scanning component for imparting motion to the beam:

the scanner comprising:

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a substrate;

a light source mounted to the substrate;

at least one light-receiving photodiode mounted to the substrate;

a cap mounted over the substrate;

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a lens for focusing the light source onto a target;

a lens for collecting light reflected from the target;

means mounted to the scanner for interacting with the scanning component; and

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wherein the scanning component is positioned adjacent to and outside the cap.

16. The combination of claim 15, wherein the scanner lacks a mirror.

17. The combination of claim 15, wherein the scanning component comprises a vibration motor having an oscillating magnet.

18. The combination of claim 17, wherein the means mounted to the scanner for interacting with the scanning component comprises a magnet.

19. The combination of claim 15, wherein the scanning component comprises an electromagnetic coil.

5 20. The combination of claim 19, wherein the means mounted to the scanner for interacting with the scanning component comprises a mechanical pivot.

21. The combination of claim 20, wherein the pivot comprises a shaft mounted within a bracket holder, the shaft being mechanically attached to the scanner.

10 22. The combination of claim 15, wherein the substrate comprises a printed circuit board having an area of approximately 4×4 mm.

23. The combination of claim 15, wherein the light source comprises a VCSEL laser chip.

15 24. The combination of claim 15, wherein the at least one light receiving photodiode comprises a CCD device.

25. The combination of claim 15, wherein the cap, focusing lens, and receiving lens are formed of plastic.

26. The combination of claim 15, wherein the means for interacting with the scanning component is mounted to the cap.

27. The combination of claim 15, wherein the means for interacting with the scanning component is mounted to the substrate.

28. The combination of claim 15, wherein the scanner is capable of range of oscillation of $\pm 20^\circ$ relative to a control rest position.

5 29. A moving-beam scanner comprising:
a light source;
at least one light-receiving photodiode;
lens means for focusing the light source onto a target and collecting
light reflected from the target;
10 housing means; and
means associated with the scanner for interacting with a scanning
component to impart motion to the beam while maintaining the light
source, lens means, and housing means fixed relative to each other;
wherein the housing means lacks a mirror.

15 30. The scanner of claim 29, further comprising a substrate.

31. The scanner of claim 30, wherein the substrate comprises a printed circuit board having an area of approximately 4×4 mm.

32. The scanner of claim 29, wherein the light sources comprises a VCSEL laser chip.

20 33. The scanner of claim 29, wherein the at least one light-receiving photodiode comprises a CCD device.

34. The device of claim 29, wherein the lens means comprises a lens for focusing the light source onto a target, and a lens for receiving light reflected from the target.

5 35. The scanner of claim 30, wherein the housing means comprises a cap mounted over the substrate.

36. The scanner of claim 35, wherein the cap and lens means are formed of plastic.

10 37. The scanner of claim 35, wherein the means associated with the scanner comprises a magnet, and a plurality of flexible connections attached to the scanner.

38. The scanner of claim 35, wherein the means associated with the scanner comprises a magnet, the magnet is mounted to the cap.

39. The scanner of claim 30, wherein the means associated with the scanner comprises a magnet, the magnet is mounted to the substrate.

15 40. The scanner of claim 29, wherein the means mounted to the scanner for interacting with the scanning component comprises a mechanical pivot.

41. The scanner of claim 40, wherein the pivot comprises a shaft mounted within a bracket holder, the shaft being mechanically attached to the scanner.

42. The scanner of claim 29, wherein the means associated with the scanner comprises at least one flexible connector attached to the scanner.

43. The scanner of claim 30, wherein the means associated with the scanner comprises at least one flexible connector attached to the substrate.

5 44. The scanner of claim 29, wherein the means associated with the scanner comprises a plurality of resilient spring-like members, one end of each of the members attached to the scanner.

10 45. The scanner of claim 30, wherein the means associated with the scanner comprises a plurality of resilient spring-like members, one end of each of the members attached to the substrate.

46. The scanner of claim 45, wherein there are at least 5 members.